

REMARKS**A. Status of the Claims**

Claims 1-5 and 8-21 are pending in this application.

B. Request for Entry of Amendment after Final Rejection

Claim 1 has been amended to delete "in an amount of a), b) and c) of 50-400 ppm in water, said water having an electrolyte content from 0.01-7% by weight".

Claim 8 has been amended to further clarify that the electrolyte content of the water is calculated in the absence of the drag reducing agent. Support for this clarification can be found, for example, in line 31 on page 1 to line 4 on page 2 of the application. Support can also be found, for example, in Test K of Table 2 where the salt content of the water is 0%, which demonstrates that the presence or absence of a drag reducing agent does not change the measurement of the electrolyte content of the water.

In accordance with 37 C.F.R. § 1.116, an amendment after a final rejection may be made which complies with any requirement of form, or which presents rejected claims in better form for consideration on appeal. The amendments to claims 1 and 8 have been made to address a rejection under 35 U.S.C. § 112 as further discussed below. Thus, in accordance with 37 C.F.R. § 1.116, entry of the amendments is proper because removal of the § 112 rejections complies with requirements of form and also places claims 1 and 8 in better form for condition for consideration on appeal.

Independent claims 1, 8 and 11 have been amended to remove the preferred R₅ substituent. This subject matter has been recovered in new claims 19-21. These amendments should also be entered since new matter has not been introduced.

C. Claim Rejections under 35 U.S.C. § 112, second paragraph

Claims 1-6 and 8-18 had been rejected as indefinite in sections 1 and 2 of the Office Action. The Office stated that it is unclear whether the concentration of the electrolytes recited in the claims is calculated by including components a), b) and c).

Applicants have removed the electrolyte content range from independent claim

1. The rejection to claim 1 is now moot.

Applicants have amended independent claim 8 to further clarify that the electrolyte content of the water is calculated in the absence of the drag reducing agent. It is submitted that claim 8 complies with § 112.

Applicants respectfully disagree with the rejection to independent claim 11. Claim 11 recites a method of reducing drag wherein "said waters containing said electrolytes have an electrolyte content from 0.01-7% by weight", and wherein at least one drag reducing agent is added to "said waters containing said electrolytes". It is therefore specified that the electrolyte content characterizes the waters before adding the drag reducing agent, not that the electrolyte content characterizes the waters after adding the drag reducing agent. It is submitted that claim 11 complies with § 112.

D. Claim Interpretation

In section 3 of the Office Action, the Office stated that "[i]t is proper for a reference that employs (a), (b), and/or (c) at concentrations reading on the electrolyte concentrations to conclude that said reference meets the electrolyte concentration limitation based on said (a), (b), and (c) concentrations." [emphasis added]. Applicants respectfully disagree.

As pointed out above and explained in the final two paragraphs on page 10 of Applicants' previous amendment dated July 28, 2008, the electrolyte content of the water is determined in the absence of the drag reducing agent. Thus, contrary to the Office's assertion, the electrolyte content range of the water is not satisfied solely when compounds (a), (b) and/or (c) of the drag reducing agent have an electrolyte content within the claimed range. Rather, the water itself in the absence of the drag reducing agent must have an electrolyte content within the claimed range. Applicants respectfully request that the Office reconsider the remarks presented in the July 28, 2008 amendment in view of the current claim amendments and remarks for a proper determination of the electrolyte content.

E. Claim Rejections under 35 U.S.C. § 102(b)

Claims 11, 15 and 16 had been rejected as being anticipated by Hellsten (U.S. 5,902,784).

In order to maintain an anticipation rejection under 35 U.S.C. § 102, the prior art must disclose each and every element of the rejected claims with sufficient clarity to prove its existence in the prior art. Applicants respectfully submit that Hellsten does not anticipate claims 11, 15 and 16 for at least the following reasons.

1. Hellsten does not disclose adding at least one drag reducing agent in an amount of 50-400 ppm having a zwitterionic surfactant of formula (I) in an amount of 20-95% by weight to waters with an electrolyte content of 0.01-7 wt% with sufficient specificity to establish an anticipation rejection under § 102

Method claim 11 includes the step of adding at least one drag reducing agent in an amount of 50-400 ppm having a zwitterionic surfactant of formula (I) in an amount of 20-95% by weight to waters with an electrolyte content of 0.01-7% by weight.

In section 5 of the Office Action, the Examiner cited col. 3, lines 6-19 of Hellsten to teach a zwitterionic surfactant of formula (I) and col. 2, line 52 to teach the claimed amount of the zwitterionic surfactant. The 0.1-10 kg/m³ range in col. 3, lines 24-27 of Hellsten was determined by the Office to equal 10-10,000 ppm and was cited to teach the 50-400 ppm range. The Office stated that the concentrations of surfactants taught by Hellsten inherently read on the claimed range of 0.01-7% by weight.

Applicants respectfully submit that Hellsten does not disclose each of the elements of independent claim 11 with sufficient specificity to establish an anticipation rejection.

According to MPEP § 2131.03:

What constitutes a "sufficient specificity" is fact dependent. If the claims are directed to a narrow range, and the reference teaches a broad range, depending on the other facts of the case, it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims. See, e.g., Atofina v. Great Lakes Chem. Corp, 441 F.3d 991, 999, 78 USPQ2d 1417, 1423 (Fed. Cir. 2006) wherein the court held that a reference temperature range of 100-500 °C did not describe the claimed range of 330-450 °C with sufficient specificity to be anticipatory.

As explained above to address the §112 rejection, the 0.01-7% electrolyte content range of the water is determined in the absence of the drag reducing agent. The only example in Hellsten which employs water having ant measurable electrolyte content prior to addition of the "drag reducing agent" is Example 1 (employing modified sea water). However, Example 1 of Hellsten differs from claim 11 in at least four respects. First, as explained in paragraph 1 on page 12 of Applicants' amendment dated July 28, 2008, Example 1 of Hellsten employs the betaine surfactant $\text{RN}^+(\text{CH}_3)(\text{CH}_3)\text{CH}_2\text{COO}^-$ which falls outside the scope of formula (I) of claim 11, because R is an alkyl group in Example 1 of Hellsten, whereas R_1 of formula (I) is an acyl group. Second, the linear dodecylbenzenesulphonate compound employed in Example 1 of Hellsten does not fall within the scope of the anionic surfactant of claim 11. Third, as explained in paragraph 2 on page 12 of Applicants' the July 28, 2008 amendment, the betaine surfactant and the sulphonate surfactant of Example 1 of Hellsten are employed in a total amount of 1240 ppm, which is over 3 times greater than the upper limit of 400 ppm recited in claim 11. Fourth, there is no disclosure in Example 1 of Hellsten that the sea water has an electrolyte content within the claimed range of 0.01-7%. Thus, Example 1 of Hellsten is the only example that employs water having a high electrolyte content (modified sea water), and Example 1 fails to disclose the combination of the claimed zwitterionic surfactant of formula (I), the specific anionic surfactant, the 50-400 ppm range of the drag reducing agent, and the 0.01-7% electrolyte content range. Applicants therefore believe that Hellsten does not teach each and every element of claim 11 with sufficient specificity to establish an anticipation rejection. It is respectfully submitted that Hellsten does not anticipate claim 11.

Moreover, with regard to the remainder of the disclosure of Hellsten, Applicants do not see a teaching which particularly describes which drag reducing agents should be used in waters having a high electrolyte content, or which drag reducing agents should be used in waters not having a high electrolyte content. Thus, Hellsten does not appear to disclose with sufficient specificity the combination of the specific drag reducing agent and electrolyte content of claim 11. In addition, Hellsten teaches in col. 3, lines 24-27 the very broad range of $0.1\text{-}10 \text{ kg/m}^3$, but does not make a distinction whether this range is applicable for waters having a high electrolyte content or for

waters having a low or no electrolyte content. This broad disclosure in Hellsten of the 0.1-10 kg/m³ range (or 10-10,000 ppm range as calculated by the Office) does not appear to specifically direct the skilled artisan to the considerably different 50-400 ppm range of claim 11. Further, citing this broad range to anticipate Applicants' claimed range would be akin to a genus anticipating a species. "It is well established that the disclosure of a genus in the prior art is not necessarily a disclosure of every species that is a member of that genus." *Atofina* at 1417, 1423 (citations omitted). It is therefore believed that the entire disclosure of Hellsten does not reasonably disclose the features of claim 11 with sufficient specificity as required to establish an anticipation rejection under § 102.

Applicants respectfully submit that Hellsten does not anticipate claims 11, 15 and 16.

F. Claim Rejections under 35 U.S.C. § 103(a)

Claims 1-6 and 8-18 had been rejected as being unpatentable over Hellsten.

In order to maintain a rejection under 35 U.S.C. § 103, the differences between the claimed invention and the prior art must be obvious to a person of ordinary skill in the art at the time the claimed invention was made. Applicants respectfully submit that claims 1-6 and 8-18 are not obvious for at least the following reasons.

1. Hellsten does not teach or suggest a drag reducing agent having the combination of zwitterionic surfactants and anionic surfactant recited in claims 1 and 8

Claims 1 and 8 recite that the drag reducing agent comprises a zwitterionic surfactant of formula (I), a zwitterionic surfactant of formula (II) and an anionic surfactant of the specified formulae.

In section 7 of the Office Action, the Office cited col. 2, lines 28 *et seq.* and col. 3, lines 6-19 to teach using mixed betaine surfactants. On page 14 of the July 28, 2008 amendment, Applicants explained that the drag reducing agents of the claimed invention having two different zwitterionic surfactants may provide a broad operable temperature range compared to the teachings in col. 3 of Hellsten. In reply to

Applicants' remarks, the Office stated in sections 17-18 of the Office Action that the claims do not specify a temperature range and that Hellsten at least suggests to employ a mixture of surfactants for a broader temperature range.

First, Applicants note that the temperature range is not a necessary technical feature of the claims. Rather, it is an effect that is achieved by employing a drag reducing agent and can be used for comparative purposes. As such, it is not a requirement to recite a temperature range in the claims.

Second, contrary to the position taken in section 18 of the Office Action, Applicants submit that it would not be obvious to employ a combination of the two specific zwitterionic surfactants with the specific anionic surfactant of claims 1 and 8 to achieve a broad operable temperature range. In col. 3, lines 6-19 of Hellsten cited by the Office, Hellsten appears to suggest only two scenarios, the first being that a betaine surfactant with an alkyl or acyl group of 14-16 carbon atoms is useful for cooling media at temperatures below 30 °C, and the second being that a betaine surfactant with an alkyl or acyl group of 18 or more carbon atoms is useful for heat transfer mediums at temperatures of 50-120 °C. Based on Applicants' current understanding, this section of Hellsten explains which betaine surfactant should be selected for a particular temperature range, namely, that a first betaine surfactant is useful for temperatures below 30°C and that a second betaine surfactant is useful for temperatures of 50-120 °C. Applicants do not believe that this section of Hellsten teaches the skilled artisan that a combination of surfactants results in a broad operable temperature range compared to the use of a single surfactant. Rather, it is believed that this section of Hellsten teaches that a first surfactant is useful for temperatures below 30°C, and that a second surfactant is useful for temperatures of 50-120 °C. Moreover, Applicants do not see any teaching in Hellsten which suggests that the skilled artisan should employ a combination of a first zwitterionic surfactant having an acyl group of 12-16 carbon atoms with a second zwitterionic surfactant having an acyl group of 18-22 carbon atoms. At best, it seems that Hellsten suggests using a betaine surfactant with an alkyl or acyl group at a first temperature range of below 30 °C, and when operating in a temperature range of 50-120 °C a different betaine surfactant with an alkyl or acyl group should be employed.

A *prima facie* obviousness rejection must be based on the disclosure in the prior art without resorting to hindsight based on Applicants disclosure. MPEP 2142.

Applicants do not see any suggestion or motivation to modify Hellsten to attain the features of claims 1 and 8 described above. Applicants therefore do not believe that it would be obvious for the skilled artisan to employ a drag reducing agent having the combination of zwitterionic surfactants and anionic surfactant recited in claims 1 and 8.

2. It would not be obvious to employ a drag reducing agent having the zwitterionic surfactant of formula (I) and the anionic surfactant in water having the electrolyte content of 0.01-7% by weight recited in claims 8 and 11

In col. 3, lines 6-19 of Hellsten cited by the Office, it is taught that a betaine surfactant with an alkyl or acyl group of 14-16 carbon atoms is useful for cooling media at temperatures below 30 °C.

The claimed invention provides results that are believed to be unexpected based on the teachings in col. 3, lines 6-19 of Hellsten. For example, Tests 6 and 7 of Table 1 of the present application demonstrate that when a zwitterionic compound of formula (I) is employed (C₁₆ acyl) the resulting operable temperature ranges are 30-66 °C and 34-65 °C, respectively. These temperature ranges are higher than the range of below 30 °C disclosed in col. 3 of Hellsten, which gives no indication that different results can be obtained when using alkyl or acyl betaines. There is no indication in Hellsten that the skilled artisan can expect to obtain the results of Tests 6 and 7 of the present application using a C₁₆ acyl zwitterionic surfactant. Applicants therefore believe that the skilled artisan would be surprised that the zwitterionic compound of formula (I) of claims 8 and 11 would contribute to the results above 30 °C shown in Tests 6 and 7 of the application.

Moreover, Example 1 of Hellsten (the only example which employs water having an electrolyte content) employs a C₁₆ alkyl betaine and gives an operable temperature range of 13-24 °C as shown by the Table in col. 3 of Hellsten. In contrast, Tests 6 and 7 of Table 1 of the present application which employ a C₁₆ acyl zwitterionic surfactant give operable temperature ranges of 30-66 °C and 34-65 °C, respectively. Tests 6 and 7 provide a better technical effect (i.e. a broader temperature range at higher

temperatures) than the C₁₆ alkyl betaine in Example 1 of Hellsten. It is submitted that these results are unexpected when considering that Hellsten teaches the same effect for C₁₄₋₁₆ alkyl and acyl betaines in col. 3. Thus, in light of the teachings of Hellsten, claims 8 and 11 are believed to be unobvious.

In sections 11-12 of the Office Action, Example 7 of Hellsten was cited to teach using palmitic acid as a C₁₆ acyl zwitterionic surfactant. However, Example 7 of Hellsten employs deionized water, not water having the electrolyte content of claims 8 and 11. In addition, the amount of palmitic acid used in Example 7 is believed to be far too low to yield a betaine within the 20-95% by weight range of claim 11. Even if all of the remaining acids were palmitic acid (which may not be the case since stearic acid is present), it can be calculated that the amount of the betaine would still be only approximately 7.7% by weight based on the total amount of the betaine and anionic surfactant. Thus, Applicants do not see anywhere in Hellsten where the limitations of claims 8 and 11 are disclosed, namely, a zwitterionic surfactant of formula (I) and the anionic surfactant in water having the electrolyte content of 0.01-7% by weight.

A *prima facie* obviousness rejection must be based on the disclosure in the prior art without resorting to hindsight based on Applicants disclosure. MPEP 2142.

Applicants do not see any suggestion or motivation to modify Hellsten to attain the features of claims 8 and 11 described above. It is submitted that claims 8 and 11 are not obvious.

3. It would not be obvious to employ a drag reducing agent having the combination of zwitterionic surfactants of formulas (I) and (II) and the anionic surfactant in water having the electrolyte content of 0.01-7% by weight recited in claim 8

In sections 18 of the Office Action, it was stated that Hellsten at least suggests employing a mixture of surfactants to obtain a broad operable temperature range. Applicants respectfully disagree.

Hellsten does not appear to teach that a broad operable temperature range is achieved when following claim 8, namely, when using the two specific zwitterionic surfactants with the specific anionic surfactant in water having an electrolyte content of 0.01-7% by weight. As shown for example in Table 1 of the application, Test 9

employing two zwitterionic surfactants and an anionic surfactant in sea water gave an operable temperature range of 25-65°C, which spans 40°C. In comparison, the only example of Hellsten which employs water having an electrolyte content is Example 1 (modified sea water). In the Table of Example 1 of Hellsten, it is shown that the operable temperature range was 13-24 °C, which merely spans 11 °C. This 11 °C span is much smaller than the 40 °C span of Test 9 of the present application. Thus, Applicants do not see a teaching in Hellsten where it is suggested to obtain a broad operable temperature range by employing a combination of zwitterionic surfactants and an anionic surfactant in water having an electrolyte content of 0.01-7% by weight as recited in claim 8.

A *prima facie* obviousness rejection must be based on the disclosure in the prior art without resorting to hindsight based on Applicants disclosure. MPEP 2142. Applicants do not see any suggestion or motivation to modify Hellsten to attain the features of claim 8 described above. It is believed that claim 8 is not obvious based on the teachings of Hellsten.

4. It would not be obvious to add a drag reducing agent in an amount of 50-400 ppm having a zwitterionic surfactant of formula (I) and an anionic surfactant to water having an electrolyte content of 0.01-7% by weight as recited in claim 11

Method claim 11 includes the step of adding a drag reducing agent in an amount of 50-400 ppm having a specific zwitterionic surfactant of formula (I) and a specific anionic surfactant to waters with an electrolyte content of 0.01-7% by weight.

It appears that Example 1 of Hellsten is the only specific teaching where a drag reducing agent is added to water having a high electrolyte content. However, Applicants respectfully submit that the method of claim 11 is not obvious based on Example 1 of Hellsten. As explained above, Example 1 of Hellsten employs an alkyl betaine surfactant, whereas R₁ the zwitterionic surfactant of claim 11 is an acyl group. Second, the sulphonate compound employed in Example 1 of Hellsten does not fall within the scope of the anionic surfactant of claim 11. Third, the betaine surfactant and the sulphonate surfactant of Example 1 of Hellsten are employed in a total amount of 1240 ppm, which is over 3 times greater than the upper limit of 400 ppm recited in claim

11. Fourth, there is no disclosure in Example 1 of Hellsten that the sea water has an electrolyte content within the claimed range of 0.01-7%. Thus, when considering the multiple differences between Example 1 of Hellsten and the limitations of claim 11, it is believed that the limitations of claim 11 would not be obvious to the skilled artisan.

A *prima facie* obviousness rejection must be based on the disclosure in the prior art without resorting to hindsight based on Applicants disclosure. MPEP 2142. Applicants do not see any suggestion or motivation to modify Hellsten to attain the features of claim 11 described above. It is submitted that claim 11 is not obvious.

G. Conclusion

In view of the actions taken and arguments presented, it is respectfully submitted that each and every one of the matters raised by the Examiner has been addressed by the present amendment and that the present application is now in condition for allowance.

Respectfully submitted,



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